

## GENERAL NOTE

### PREDATION ON ADULTS OF *ANARTIA FATIMA* (FAB.)

**Additional key words:** Nymphalidae, Costa Rica.

Vertebrate predation on adults can be a significant source of mortality in butterfly populations (Bowers et al. 1985, *Evolution* 39:93-103), yet the incidence of such predation has been documented in few cases. Although direct observations of vertebrate predation are rare (exceptions: Brown & Vasconcellos-Neto 1976, *Biotropica* 8:136-141; Fink & Brower 1981, *Nature* 291:67-70; Ehrlich & Ehrlich 1982, *J. Lepid. Soc.* 37:148-152), several studies have examined museum specimens or specimens collected during field sampling for evidence of bird predation (Carpenter 1941, *Proc. Zool. Soc. Lond.* A 1941: 223-231; Shapiro 1974, *Am. Nat.* 108:229-232, and others). Characteristic damage inflicted by birds (and probably lizards) includes symmetrical tears on the wings, straight cuts across major veins, triangular tears, and beak imprints (Sargent 1973, *J. Lepid. Soc.* 27:175-192; Bowers & Wiernasz 1979, *Ecol. Entomol.* 4:205-209). In general, unpalatable butterfly species have a higher incidence of beak imprints due to birds tasting the butterfly or remembering a previous bad experience and voluntarily releasing it (Shapiro, cited above; Bowers & Wiernasz, cited above). In contrast, palatable butterflies have a higher incidence of beak tears due to ripping their wings out of the bird's beak (Shapiro, cited above; Bowers & Wiernasz, cited above).

This study assessed the incidence of predation on adults of the common, palatable (Silberglied et al. 1980, *Science* 209:617-619) butterfly, *Anartia fatima* (Fab.) (Nymphalidae), at Finca La Selva Biological Station, Costa Rica.

Sixty *A. fatima* adults were collected in the grassy area near the laboratory at Finca La Selva and at "Rafael's house" by the river on 8 March 1986. The butterflies were stored in envelopes and later sexed and assessed for evidence of predation. Butterflies showing potential signs of predation were examined for characteristic indications of bird or lizard attack (Bowers & Wiernasz, cited above).

The sex ratio of our sample of 60 butterflies was 38 males and 22 females (1.7:1). Seven of the 60 butterflies (12%) showed clear evidence of predation, 6/38 males (16%), and 1/22 females (4.5%). Although there were more males damaged than females, the difference was not significant (Fisher Exact Test,  $P_a = 0.38$ , power  $[1 - \beta] = 0.21$  [Zar 1984, *Biostatistical analysis*, 2nd ed., Prentice Hall, New Jersey]). Four individuals had symmetrical damage on two hindwings (HW) only, and another showed damage on two hindwings and a forewing (FW), indicating that the individuals were attacked while the wings were held together. Two individuals showed damage on a single side, one on the right HW-FW, and the other on one FW, indicating that the butterflies were probably attacked while the wings were open (Bowers & Wiernasz, cited above) such as when basking or flying. These results suggest that most predation occurred while the butterflies were roosting, probably at dawn or dusk (Rawlins & Lederhouse 1978, *J. Lepid. Soc.* 32: 145-159).

Twelve % predation is similar to what has been found in some other butterfly populations such as *Cercyonis pegala* (Nymphalidae: Satyrinae) (Bowers & Wiernasz, cited above) and *Ascia monuste* (Pieridae) (Pough & Brower 1977, *Am. Midl. Natur.* 98:50-58). We were unable to distinguish damage potentially caused by birds or lizards, and both may prey on butterflies (Boyden 1976, *Evolution* 30:73-81; Ehrlich & Ehrlich, cited above; refs. in Bowers et al., cited above).

The damaged individuals we collected were those that escaped after being attacked. We found only beak tears on the wings, and no beak imprints, concordant with the known palatability of these butterflies to predators (refs. in Silberglied et al. 1979, *Psyche* 87: 219-260; Harrison & Crabtree, pers. obs.). Our small sample indicates that individuals attacked at the hindwings are more likely to escape, perhaps because of the fragility of these wings compared to the forewings. *Anartia fatima*, as a palatable butterfly, thus likely escapes by tearing its wings out of the attacking animal's mouth or beak. This would be an easy task if the butterfly were captured by the flimsy hindwings.

Results from this study, as well as that of Silberglied et al. (1980, above) indicate that predation on these butterflies is relatively common. Although we do not have information on the number of successful attacks by predators on *A. fatima*, its palatability to both vertebrate and invertebrate predators coupled with the incidence of damage suggests that such predation may be a significant source of mortality.

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